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# Author's Accepted Manuscript

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## Moving beyond the weight-loss paradigm of exercise interventions for mental illness

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We read with interest the recent correspondence by Carneiro et al. 2016, which presents a strong case for moving beyond the 'weight loss paradigm' of exercise interventions for people with depression. The authors present the argument, along with supporting evidence, that although 'weight loss' may often be advertised as the key benefit of exercise to encourage people towards physical activity, this is in fact rarely achieved from short-term exercise

programs (Malhotra et al., 2015). Furthermore, as mentioned by the authors, recent meta-analyses and clinical trials have provided strong evidence that even in the absence of weight-loss, exercise can still significantly reduce symptoms of mental disorders such as depression and schizophrenia (Carneiro et al 2015; Firth et al. 2015) - showing that weight loss is not a necessary outcome for the psychological benefits of exercise.

However, it should not be forgotten that all of the benefits of exercise for people with mental disorders are ultimately dependent on their engagement with exercise sessions – which requires motivation. A recent meta-analysis of motivations towards exercise reported by 6321 psychiatric patients found that most perceive ‘physical health’ as the primary reason to exercise (Firth et al. 2016a). More specifically, ‘weight loss’ was the most widely-endorsed physical health benefit, with 83% of the patients reported exercising for this reason. Therefore, we must confront the reality that although weight loss may not be a necessary (or even achievable) target outcome of exercise interventions for people with mental illnesses, their belief that exercise could help them to lose bodyweight is an important factor influencing their uptake and engagement in physical activity.

Nevertheless, ‘improving fitness’ is also a popular reason to exercise among people with mental illnesses – endorsed by 75% of patients in the aforementioned meta-analysis (Firth et al. 2016). Studies in younger people with first-episode psychosis have even shown that fitness is prioritized over weight-loss as an exercise goal in this population (Firth et al. 2016b). This is perhaps because obesity is less likely to be an immediate issue in the early stages of illness (Vancampfort et al. 2015), whereas improving one’s energy levels and physical capabilities can always be desirable. Additionally, cardiorespiratory fitness (unlike bodyweight) is readily

modified by exercise interventions – with meta-analytic data in psychiatric populations showing significant increases in “VO<sub>2</sub> Max” (the gold standard of fitness measurements) within just 12 weeks (Vancampfort et al. 2016a).

It should also be considered that whereas weight loss seems to have no significant relationship with psychological benefits of exercise (Carneiro et al. 2015, Firth et al. 2015), the opposite may be true for fitness. Specifically, clinical trials in people with mental illnesses have shown that fitness improvements from exercise interventions also predict increases in brain structure and functioning (Pajonk et al. 2010; Kimhy et al. 2015). Furthermore, a recent meta-regression of 10 controlled exercise trials in 385 patients with schizophrenia found that the fitness improvements were one of the strongest predictors of cognitive enhancement following exercise interventions (Firth et al. 2016c). Although the correlation across studies was non-significant ( $p=0.08$ ), this could indicate that interventions which are most effective for improving fitness may also be most likely to improve cognition.

Additionally, a wealth of research in the general population has consistently found that high levels of physical fitness are more protective of cardiovascular disease morbidity and mortality than low bodyweight / body mass index (Kodama et al. 2009). Thus, we agree with Carneiro et al. (2016) that the focus of exercise interventions for people with mental illnesses should be shifted from ‘weight loss’ to ‘fitness improvement’. In all, the available evidence indicates that shifting the focus in this way would improve the delivery, engagement and outcomes of exercise interventions, since providing these attainable goals will boost a patient’s motivation towards exercise (Vancampfort et al. 2016), and targeting fitness over fat loss is more broadly

beneficial for reducing cardiometabolic risk and improving both physical and cognitive functionality.

In moving even further ‘beyond the weight loss paradigm’ of exercise interventions in mental healthcare, the role of resistance training should also be considered, as this is currently under-researched. Although weight training and resistance exercise is commonly associated only with gaining muscle, there are many other physical and psychological benefits of such training methods for people with mental illnesses. First, this may offer an alternative method for attenuating the metabolic dysfunction associated with psychotropic medications, as resistance exercise has equally positive effects as aerobic training on the metabolic features of diabetes, significantly reducing body fat and improving insulin within 16 weeks (Bacchi et al. 2012).

Second, exercise interventions for people with depression and schizophrenia which incorporate resistance training alongside or independently of aerobic exercise have found significant improvements in symptoms, cognition and real-world functioning (Firth et al. 2016d, Krogh et al. 2014, Strassnig et al. 2015).

Since the metabolic and neurocognitive benefits of resistance training may occur through independent mechanisms to aerobic exercise (Cassilhas et al. 2013, Jurca et al. 2005), it could be hypothesized that exercise interventions which incorporate both of these methods may confer maximal benefits for patients. Again however, motivation must be considered, and real-life implementation of these research findings could mean offering patients the choices of different aerobic and/or resistance exercises to add into their personalized training programs. Indeed, feasibility studies of patients with psychosis which offer customized aerobic and resistance exercise programs have already proven effective for engaging patients, and

beneficial for both physical and mental health (Firth et al. 2015, Curtis et al. 2014). Clearly, physical activity should not be reduced to a weight management strategy, but rather prioritized as a self-management strategy for anyone living with mental illness. Encouraging and supporting patients to undertake types of exercise which matches their own preferences and personal goals will help to beyond the damaging 'weight loss paradigm' of exercise interventions for people with mental illness, ensuring that future interventions are motivating, engaging and effective for improving recovery.

### **Disclosures**

All authors declare no conflict of interests

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## Highlights

- Exercise interventions for people with mental illness do not consistently result in weight loss, but can significantly reduce cardiovascular risk and psychiatric symptoms
- Focusing on fitness outcomes of exercise, as opposed to weight-loss, may provide patients with more achievable and valuable goals
- The role of resistance training interventions for psychiatric populations is currently under-researched. Incorporating this alongside aerobic exercise could confer substantial benefits for cardiometabolic health and mental well-being